

WHAT IS CLAIMED IS:

1. An LCD device including an EM type touch panel comprising:
an LCD panel having first and second substrates facing each other, and a liquid crystal layer between the first and second substrates;
an EM sensor having first and second coil arrays formed of a transparent electrode, the EM sensor integrated with any one of the first and second substrates in the LCD panel; and
a backlight unit below the LCD panel.
2. The LCD device of claim 1, further comprising a controller for controlling the EM sensor below the backlight unit.
3. The LCD device of claim 1, wherein the first coil array is perpendicular to the second coil array.
4. The LCD device of claim 1, wherein the EM sensor is on an outer surface of any one of the first and second substrates.
5. The LCD device of claim 4, wherein the EM sensor includes an adhesive layer on a surface opposite to the LCD panel.
6. The LCD device of claim 1, wherein the EM sensor is on an inner surface of any one of the first and second substrates.
7. The LCD device of claim 1, wherein the EM sensor includes:

a transparent substrate, wherein the first coil array is on the transparent substrate;
a first transparent insulating layer on an entire surface of the transparent substrate,
wherein the second coil array is on the first transparent insulating layer; and
a second transparent insulating layer on the first transparent insulating layer.

8. The LCD device of claim 7, wherein each of the first and second coil arrays include a plurality of coils, and each of the plurality of coils has first and second open ends.

9. The LCD device of claim 8, wherein the first open end is electrically connected to a grounding voltage.

10. The LCD device of claim 9, wherein the second open end is electrically connected to a MUX.

11. The LCD device of claim 10, wherein one of the plurality of coils is selected, and then a voltage from the MUX is applied to the selected coil.

12. The LCD device of claim 7, wherein the transparent electrode includes oxide indium, oxide tin, oxide zinc, indium-tin-oxide, tin-antimony-oxide or indium-zinc-oxide.

13. An LCD device including an EM type touch panel comprising:
an LCD panel having first and second substrates facing each other and a liquid crystal layer between the first and second substrates;
a first polarizing plate on an outer surface of the first substrate;
a second polarizing plate on an outer surface of the second substrate;

an EM sensor having first and second coil arrays formed of a transparent electrode, the EM sensor integrated with any one of the first and second polarizing plates; and a backlight unit below the LCD panel.

14. The LCD device of claim 13, further comprising a controller for controlling the EM sensor below the backlight unit.

15. The LCD device of claim 13, wherein the first coil array is perpendicular to the second coil array.

16. The LCD device of claim 13, further comprising film-type adhesive layers between inner surfaces of the first and second polarizing plates and outer surfaces of the first and second substrates.

17. The LCD device of claim 16, wherein the EM sensor is on an outer surface of any one of the first and second polarizing plates.

18. The LCD device of claim 17, wherein the EM sensor includes an adhesive layer on a surface opposite to the first or second polarizing plate.

19. The LCD device of claim 16, wherein the EM sensor is between the LCD panel and the first or second polarizing plate.

20. The LCD device of claim 19, wherein the EM sensor further includes an adhesive layer on a surface opposite to the LCD panel.

21. The LCD device of claim 13, wherein the EM sensor includes:
 - a transparent substrate, wherein the first coil array is on the transparent substrate;
 - a first transparent insulating layer on an entire surface of the transparent substrate, wherein the second coil array is on the first transparent insulating layer; and
 - a second transparent insulating layer on the first transparent insulating layer.
22. The LCD device of claim 21, wherein each of the first and second coil arrays include a plurality of coils, and each of the plurality of coils has first and second open ends.
23. The LCD device of claim 22, wherein the first open end is electrically connected to a ground voltage.
24. The LCD device of claim 23, wherein the second open end is electrically connected to a MUX.
25. The LCD device of claim 24, wherein one of the plurality of coils is selected, and then a voltage from the MUX is applied to the selected coil.
26. The LCD device of claim 21, wherein the transparent electrode includes oxide indium, oxide tin, oxide zinc, indium-tin-oxide, tin-antimony-oxide or indium-zinc-oxide.
27. The LCD device of claim 21, wherein the transparent substrate includes any one of Polyethylene Terephthalate, Polypropylene Terephthalate, Polyethylene-2, 6-Naphtalate, Syndiostatic, Polystyrene, Norbornene-group polymer, Polycarbonate and Polyarylate.

28. An LCD device including an EM type touch panel comprising:

first and second substrates facing each other;

a thin film transistor array on the first substrate;

a plurality of pixel electrodes electrically connected to respective thin film transistors of the thin film transistor array;

an EM sensor including first and second coil arrays formed of a transparent electrode on the second substrate;

a color filter layer on the EM sensor corresponding to the pixel electrodes;

an overcoat layer on the color filter layer;

a common electrode on the overcoat layer;

a liquid crystal layer between the first and second substrates; and

a backlight unit below the first substrate.

29. The LCD device of claim 28, further comprising a light-shielding layer between the EM sensor and the color filter layer and a controller below the backlight unit for controlling the EM sensor.

30. The LCD device of claim 28, wherein the EM sensor includes:

a first transparent insulating layer on the overcoat layer, wherein the first coil array is formed between the first transparent insulating layer and the overcoat layer; and

a second transparent insulating layer on the first transparent insulating layer, wherein the second coil array is formed between the first transparent insulating layer and the second transparent insulating layer.

31. The LCD device of claim 30, wherein the first and second transparent insulating layers are formed of organic layers.

32. The LCD device of claim 31, wherein the organic layer includes PhotoAcryl, BenzoCycloButen BCB or Polyamide compound.

33. The LCD device of claim 30, each of the first and second coil arrays include a plurality of coils, and each of the plurality of coils has first and second open ends.

34. The LCD device of claim 33, wherein the first open end is electrically connected to a grounding voltage.

35. The LCD device of claim 34, wherein the second open end is electrically connected to a MUX.

36. The LCD device of claim 35 wherein one of the plurality of coils is selected, and then a voltage from the MUX is applied to the selected coil.

37. The LCD device of claim 28, wherein the transparent electrode includes any one of oxide indium, oxide tin, oxide zinc, indium-tin-oxide, tin-antimony-oxide and indium-zinc-oxide.

38. The LCD device of claim 28, wherein the overcoat layer is formed of an organic layer.

39. The LCD device of claim 38, wherein the organic layer includes any one of PhotoAcryl, BenzoCycloButen BCB and Polyamide.

40. An LCD device including an EM type touch panel comprising:
first and second substrates facing each other;
a plurality of pixel regions on the first substrate, each pixel region including a thin film transistor, pixel electrode, and a common electrode;
a color filter layer on the second substrate corresponding to the plurality of pixel regions;
an EM sensor including first and second coil arrays formed of a transparent electrode on the color filter layer;
an overcoat layer on the EM sensor;
a liquid crystal layer between the first and second substrates; and
a backlight unit below the first substrate.

41. The LCD device of claim 40, further comprising a light-shielding layer on the second substrate below the color filter layer and a controller below the backlight unit for controlling the EM sensor.

42. The LCD device of claim 40, wherein the EM sensor includes:
a first transparent insulating layer on the overcoat layer, wherein the first coil array is formed between the first transparent insulating layer and the overcoat layer; and
a second transparent insulating layer on the first transparent insulating layer, wherein the second coil array is formed between the first transparent insulating layer and the second transparent insulating layer.

43. The LCD device of claim 42, wherein the first and second transparent insulating layers are formed of organic layers.

44. The LCD device of claim 43, wherein the organic layer includes PhotoAcryl, BenzoCycloButen BCB or Polyamide compound.

45. The LCD device of claim 42, wherein each of the first and second coil arrays include a plurality of coils, and each of the plurality of coils has first and second open ends.

46. The LCD device of claim 45, wherein the first open end is electrically connected to a grounding voltage.

47. The LCD device of claim 46, wherein the second open end is electrically connected to a MUX.

48. The LCD device of claim 47, wherein one of the plurality of coils is selected, and then a voltage from the MUX is applied to the selected coil.

49. The LCD device of claim 40, wherein the transparent electrode includes any one of oxide indium, oxide tin, oxide zinc, indium-tin-oxide, tin-antimony-oxide and indium-zinc-oxide.

50. An LCD device including an EM type touch panel comprising:
first and second substrates facing each other;

a thin film transistor array on the first substrate;
a plurality of pixel electrode electrically connected to respective thin film transistors of the thin film transistor array;
an insulating layer on the first substrate;
an EM sensor including first and second coil arrays formed of a transparent electrode on the insulating layer;
a color filter layer on the second substrates;
a liquid crystal layer between the first and second substrates; and
a backlight unit below the first substrate.

51. The LCD device of claim 50, further comprising a common electrode on any one of the first and second substrates and a controller for controlling the EM sensor below the backlight unit.

52. The LCD device of claim 50, wherein the insulating layer is formed of an organic layer.

53. The LCD device of claim 52, wherein the organic layer includes any one of PhoyoAcryl, BenzoCycloButen BCB or Polyamide.

54. The LCD device of claim 50, wherein the EM sensor includes:
a first transparent insulating layer on the insulating layer, wherein the first coil array is formed between the first transparent insulating layer and the insulating layer; and

a second transparent insulating layer on the first transparent insulating layer, wherein the second coil array is formed between the first transparent insulating layer and the second transparent insulating layer.

55. The LCD device of claim 54, wherein each of the first and second coil arrays include a plurality of coils, and each of the plurality of coils has first and second open ends.

56. The LCD device of claim 55, wherein the first open end is electrically connected to a grounding voltage.

57. The LCD device of claim 56, wherein the second open end is electrically connected to a MUX.

58. The LCD device of claim 57, wherein one of the coils is selected, and then a voltage from the MUX is applied to the selected coil.

59. The LCD device of claim 50, wherein the transparent electrode includes any one of oxide indium, oxide tin, oxide zinc, indium-tin-oxide, tin-antimony-oxide and indium-zinc-oxide.